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INTERNATIONAL PRELIMINARY EXAMINATION REPORT  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 146461.9 DAB		<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/IL 03/00690	International filing date (day/month/year) 20.08.2003	Priority date (day/month/year) 20.08.2002	
International Patent Classification (IPC) or both national classification and IPC E01C23/088			
Applicant MANOR, Zamir			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 6 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"><li>I <input checked="" type="checkbox"/> Basis of the opinion</li><li>II <input type="checkbox"/> Priority</li><li>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li><li>IV <input type="checkbox"/> Lack of unity of invention</li><li>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li><li>VI <input type="checkbox"/> Certain documents cited</li><li>VII <input type="checkbox"/> Certain defects in the international application</li><li>VIII <input type="checkbox"/> Certain observations on the international application</li></ul>			
Date of submission of the demand  15.03.2004		Date of completion of this report  24.08.2004	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer  Kerouach, M  Telephone No. +49 89 2399-7285 	

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. **PCT/IL 03/00690**

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1, 3, 4, 7 as originally filed  
2, 5, 6 filed with telefax on 08.03.2004

**Claims, Numbers**

1-13 filed with telefax on 08.03.2004

**Drawings, Sheets**

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).  
☐ the language of publication of the international application (under Rule 48.3(b)).  
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority in written form.  
☐ furnished subsequently to this Authority in computer readable form.  
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.  
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

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5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

**see separate sheet**

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-13
	No: Claims	
Inventive step (IS)	Yes: Claims	1-13
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-13
	No: Claims	

2. Citations and explanations

**see separate sheet**

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**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/IL03/00690

**Re Item I**

**Basis of the report**

The applicant has amended page 2 of the description for bringing it into conformity with new claim 1. However, he added on line 18 the expression "at least" (cf. "*applying heat at least directly to the bristles*"), which appears to go beyond the disclosure in the international application as filed. Indeed, it implies that the bristles of the brush could, for example, also be heated indirectly. Since the applicant did not give any indication where there is a basis for this amendment in the original application, the report is established as if this amendment had not been made (Rule 70.2(c) PCT).

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. The following documents are referred to in this report:  
**D1:** DE 26 50 487 A (WIRTGEN REINHARD) 11 May 1978 (1978-05-11)  
**D2:** DE 31 40 984 A (WUERFEL WOLFGANG) 26 May 1983 (1983-05-26)
2. **D1**, which is considered to represent the most relevant state of the art, discloses (cf. page 6, paragraph 1; page 8, paragraphs 2 and 3; figure 1) an apparatus for erasing a road marking on a road lane from which the subject-matter of claim 1 differs in that the bristles of the rotatable brush are adapted, for removing the marking, to be heated directly by a heating source mounted on the chassis.

The **problem** to be solved by the present invention may therefore be regarded as to provide an apparatus for erasing a road marking which allows easy removal of the road markings material from the brush after said brush has removed the road marking from the road.

The **solution** proposed in claim 1 of the present application is considered as involving an **inventive** step (Article 33 (3) PCT) for the following reasons:

Although the apparatus disclosed in **D1** comprises a heating source for removing the road markings, this heating source is directed to the road surface for heating the markings before the brush removes them mechanically without being heated itself.

Further, although **D2** discloses a device comprising a brush which is heated for removing all kinds of paintings, said brush is heated electrically by a wire wound around the frame holding the brush and is not rotatable. This kind of heated brush appears not to be suitable for road marking removal.

Further, **D2** does not indicate any advantage for heating the brush which could lead the skilled person to combine documents **D1** and **D2** to solve the problem posed.

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- The subject of claim 1 is therefore **new** and involves an **inventive** step (Article 33 (2) and (3) PCT)
3. Claims **2-11** are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.
  4. The subject-matter of independent **method** claim **12** is also novel and inventive since it contains steps for operating an apparatus as claimed in claim 1.
  5. Claim **13** is dependent on claim 12 and as such also meets the requirements of the PCT with respect to novelty and inventive step.
  6. The subject-matter according to any of claims 1 to 13 is industrially applicable (Article 33 (4) PCT).

**Observations**

7. Independent claim 1 is not in the **two-part form** in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (cf. **D1**) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
8. The features of the claims are not provided with **reference signs** placed in parentheses (Rule 6.2(b) PCT).
9. The new filed page 2 of the description does not include the first line of the originally filed page 2, rendering thereby the meaning of the corresponding sentence unclear.
10. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents **D1** and **D2** is not mentioned in the **description**, nor are these documents identified therein.
11. Contrary to the requirements of Rule 5.1(a)(iii) PCT, the **description** has not been brought into conformity with the new claims filed, especially from page 3 onwards.
12. The **last paragraph** of the description should have been **deleted**, to avoid an expansion of the extent of protection in some vague and not precisely defined way (PCT-Guidelines C-III, 4.3a and 6.5).

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the formation of cavities or depressions that may endanger driving and damage vehicles.

## SUMMARY OF THE INVENTION

The present invention relates to an apparatus and method for removing  
5 road markings such as lane lines, stripes, arrows and the like (hereinafter in the  
specification and claims, "*road markings*"), from roads the apparatus comprising  
a chassis adapted to travel over the road lane; a heating source mounted to the  
chassis for ~~directly or indirectly~~ applying heat to the road marking via ~~;~~ and  
10 bristles of a positively driven rotatable brush mounted to the chassis. The brush  
has bristles are contactable with the road marking and are adapted for heating and  
removing the road marking, ~~when heated~~, from the road.

The method for removing road markings from roads comprises:

- 15 - providing an apparatus comprising a chassis with a heating  
source and a rotatable brush mounted thereto, the brush having  
bristles;
- bringing the apparatus to the road lane;
- causing the chassis to travel over the road lane;
- applying heat at least directly ~~or indirectly~~ to the bristles road  
20 marking; and
- causing the bristles of the brush to rotate and contact the road  
marking thereby removing the marking.

The chassis is typically adapted for mounting or attaching to the front of a  
truck or other suitable vehicle. Mounting to the front of the truck aids visibility of  
the markings to be removed, however, the apparatus can be designed for rear  
25 mounting or even mounting such that at least the bulk of the apparatus is  
disposed to the side of the truck.

It is preferable that the apparatus comprises a means to displace the  
chassis, or at least the brush, in a direction transverse to the truck, to facilitate  
alignment of the brush with the markings. Alternatively, the apparatus may be

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A supply line 70, at least a portion of which is helically configured, is provided for flowing combustible gas or liquid (e.g. butane, propane, natural gas, kerosene etc.) from gas containers 72 carried by the vehicle 10 (Fig. 1). The helical configuration allows for movement of the heating source 50 and an analogous configuration (not seen) allows the transverse movement of the apparatus 12.

The apparatus 12 further comprises a high-speed rotatable brush 80, mounted on an axle 82 which is driven by a motor 84 via a belt 86 - or other known means. The arrangement can be designed such that the brush 80, comprising bristles 88, can be rotated in either direction, however it is typically more effective for the brush to rotate in the direction opposite that of the progress of the vehicle 10.

The pressure of the brush 80 on the road markings M could be defined simply by the stiffness of the bristles 88 of the brush 80. To this end, the brush 80 could comprise bristles 88 of any combination of different length, thickness, stiffness and material (as long as the bristles reasonably withstand the heat and wear) to thereby optimize the pressure on the markings M and their removal.

However, to control and even out the pressure of the brush 80 on the road markings M, other means such as a spring (not shown) biased to press downward with a desired pressure or a weight (not shown) may be associated with the brush.

It should be understood that the bristles 88 of the brush 80 are configured in a pattern such that they contact the road markings M throughout the area of the markings, and to this end, groups of bristles may be shifted, offset, irregularly arranged, etc. For sake of clarity, this is not depicted in the figures.

The operation of the apparatus 12 for removing road markings M is as follows:

First, the truck 10 is driven to the location where erasure of road markings M is desired and it is positioned in alignment therewith. Due to the transverse displacement arrangement as explained above (using the spindle 20), it is not

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mandatory that the truck 10 itself be centered on the markings M, rather only the apparatus 12 - and in actuality the brush 80 - need be aligned with the road markings M. This feature allows removal/erasure of markings M adjacent the margins or shoulders of road lanes without driving with half the vehicle 10 off the road; and allows the removal of centrally located road markings without need to drive the vehicle in the center of the road R which would potentially block traffic.

Then, while the torches 51 are burning and the brush 80 is rotating, the vehicle 10 is slowly driven over the road markings M thereby removing them.

10 The heating of the road markings M by the torches 51 may be direct, with the distance of the torches from the road markings being adjustable, as described above. The distance of the torches 51 from the road markings M can be used to adjust and optimize the heat applied to the markings.

However, the heating of the road markings M may be indirect, for  
15 example by means depicted in Figs. 5 and 6 (where reference numerals similar to those of Figs. 1-4 have been used but with the numeral "1" preceding).

As seen in Figs. 5 and 6, the location and mode of operation of the brush 180 remains unchanged. However, the heating source 150 with torches 151 now corresponds with the brush 180 such that the heat is applied to the bristles 188 of  
20 the brush 180. The torches 151 are preferably at an angle to the bristles 188, as seen in Fig. 5. This has the effect of improving the heat transfer to the bristles 188 as well as avoiding excessive heating of the hub of the brush 180.

Hence, now it is the heated bristles 188 that heat the road markings M and together with rotation of the brush 180 remove the markings. Thus, the only  
25 portion of the road R that is significantly heated is that portion contacted by the brush 180 - presumably just the road markings M.

The heating source 150 is again displaceable by an arrangement comprising, for example, a pneumatic cylinder 152, a piston 154, and supporting rollers 158 and 160 for adjusting the amount of heat applied to the brush 180.  
30 Examples of alternate arrangements for displacing the heating source 50, 150